

REMARKS

Claims 1-7 are now pending in the application. Claims 8-14 have been withdrawn. Claims 1-7 have been rejected under 35 U.S.C. § 103(e). Claim 1 is amended. The above amendments and the following remarks are considered by Applicants to overcome each rejection raised by the Examiner and to place the application in condition for allowance. An early Notice of Allowance is therefore requested.

Applicants acknowledge the Examiner for the Interview conducted on October 11, 2005. In the interview, claims 1-7 were discussed in view of the cited references. As indicated in the interview, Applicants have amended claim 1 to recite that a piezoelectric sheet is disposed over a plurality of pressure chambers. It is respectfully submitted that by this Amendment, claims 1-7 recite patentable subject matter.

I. Objection to the Specification

The specification was objected for containing an informality. The specification is amended to overcome the cited informality. In view of this amendment, Applicants request the withdrawal of the objection to the specification.

II. Rejection of pending claims 1-4 Under 35 U.S.C. 103(a) as being unpatentable over Shimada et al. in view of Corwin et al.

A. Relevant Law

An Examiner may find each claimed element of an invention in the prior art references but it is not sufficient to establish obviousness of the invention. *In re Rouffet*, 47 USPQ2d 1453 (Fed. Cir. 1998). A determination of obviousness must involve more than an indiscriminate combination of the prior art; there must be some motivation, suggestion, or teaching of the desirability of combining or modifying the references to arrive at the claimed method. *In re Dance*, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998). Further, rejecting claims solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed inventions itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention is “an inappropriate process by which to determine patentability.” *Sensonics, Inc. v. Aerosonic Corp.*, 38 USPQ2d 1551 (Fed. Cir. 1996).

B. Summary of Cited References

Shimada discloses an ink jet recording head having a flow passage substrate 10 and pressure generation chambers 12 communicating with nozzle openings. Shimada also discloses a piezoelectric element being placed on one side of the flow passage formation substrate 10 via a diaphragm and having at least a lower electrode 60, a piezoelectric layer 70, and an upper electrode 80.

Corwin is directed to a pre-stressed spherical electro-acoustic transducer. Specifically, Corwin discloses transducers made of electro-strictive ceramic material and spherical-shell configurations for use in underwater applications. Corwin discloses an outer electrode specifically having internal tensile stress which places the ceramic material under a predetermined degree of initial compression.

C. Argument

The Examiner states that the combination of the cited references teaches or suggests the claimed invention. Moreover, the Examiner takes the position that Shimada discloses all the features recited in claim 1 except for the feature of the actuator unit receiving a stress of -40 MPa to 10 MPa in a direction substantially parallel to a face thereof bonded to the passage unit. However, the Examiner states that Corwin cures the deficiency of Shimada. More specifically, the Examiner states that Corwin discloses that a spherical transducer is further provided with an outer electrode specifically having and internal tensile stress which places the ceramic material under a predetermined degree of initial compression. (Column 2, Lines 46-55). As a result, the Examiner takes the position that it would have been obvious to one skilled in the art to use the pre-stressed condition of Corwin in the inkjet recording head of Shimada. Applicant respectfully traverses the rejection of claim 1 under 35 U.S.C.103(a).

Claim 1 is amended to recite that the piezoelectric sheet is disposed over a plurality of pressure chambers. Shimada fails to teach or suggest this feature. Although Shimada discloses a piezoelectric film 70, the piezoelectric film 70 of Shimada is not disposed over the plurality of pressure chambers. Rather the lower electrode film 60, the piezoelectric film 70 and the upper electrode film 80 are etched together. In other words, the piezoelectric film 70 is formed in each of the pressure chambers. (See Paragraph 0165 of Shimada). In contrast, in the claimed invention, the piezoelectric sheet is disposed over the pressure chamber. In view of this distinction, Applicants respectfully submit that Shimada fails to teach or suggest the features recited in amended claim 1. Corwin does not cure this deficiency.

It is also submitted that the combination of Corwin and Shimada fail to teach or suggest the feature of an actuator unit receiving a stress of -40 MPa to 10MPa in a direction substantially parallel to a face thereof bonded to the passage unit. Although Corwin discloses a predetermined degree of initial compression, Corwin fails to teach or suggest the specific range of -40MPa to 10MPa as recited in claim 1. A general statement of providing a predetermined stress does not make the specific range disclosed in the present invention obvious. Furthermore, even if Corwin provides a predetermined stress range, Corwin does not provide any specific examples falling within the claimed range. Corwin merely provides a general statement indicating that a predetermined stress is applied to the ceramic material. Thus, there is no specificity to the teaching to disclose the range claimed in the present invention. (See MPEP 2131.03)

Moreover, Applicants respectfully submit that there is no motivation to combine the teaching of Shimada with Corwin. It is submitted that one skilled in the art would not combine the teachings of Corwin with that of Shimada. The Examiner states that since Corwin discloses “enabling applications of a much greater excitation and development of much greater acoustic intensity without rupture of the transducer”, motivation to combine the references is provided. Corwin is directed to the use of electro-acoustic transducers made in a spherical shell configuration for use in underwater applications (Column 1, Line 14). The claimed invention states that in operating conditions a specific stress is utilized to optimize the capacitance and the drive voltage. First, Corwin is utilized in underwater applications, wherein different stresses are required to operate the transducer. Secondly, Corwin discloses a transducer with a spherical shell configuration, which is not obvious to combine with the teachings of a print head. Thus, one skilled in the art would not combine the use of a transducer used for underwater applications with that of a transducer used in an ink-jet printer. Although, Corwin discloses a transducer, one in the art would not use the stresses applied to a transducer for underwater applications with that of an ink-jet printer without the use of hindsight. Therefore, it is respectfully submitted that there is no motivation to combine the teachings of a transducer with a spherical configuration used for underwater applications with a print head. Accordingly, Applicants request the withdrawal of the rejection of claim 1 under 35 U.S.C. 103(a).

Claims 2-4 are dependent upon claim 1. It is submitted that for at least the reasons mentioned above, claims 2-4 recite patentable subject matter. Therefore, Applicants request the withdrawal of the rejection of claims 2-4 under 35 U.S.C. 103(a).

III. Rejection of pending claims 5-7 Under 35 U.S.C. 103(a) as being unpatentable over Shimada et al. in view of Corwin et al and further in view of Akahane.

A. Summary of cited references

Akahane discloses an ink jet recording head having a silicon monocrystalline substrate provided with a piezoelectric element formed by a thin film process. A plurality of pressure generating chambers 12 are arranged in high density anisotropic etching. A narrow part and a communicating part are sealed by a sealing plate. A common ink chamber is provided with the sealing plate as one surface and a thin wall forms at least a part of the surface which is opposite to the sealing plate.

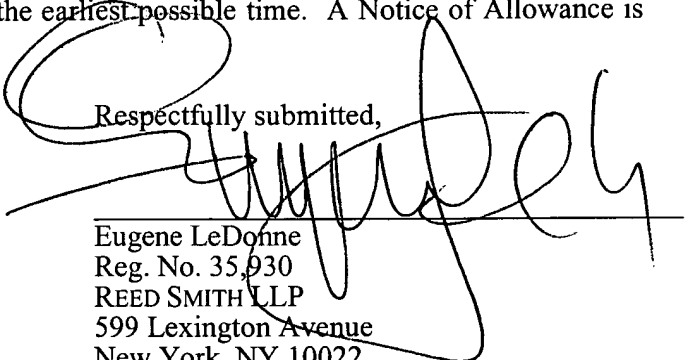
B. Argument

It is respectfully submitted that the cited references fail to teach or suggest all the features recited in claims 5-7. Claims 5-7 are dependent upon claim 1. The Examiner indicates that Akahane discloses the passage unit and the actuator unit being bonded to each other with an epoxy-based thermosetting adhesive that has a curing temperature of 80 Celsius. However, in Akahane, it is disclosed that a lower electrode film 80, which is configured in a piezoelectric element is formed on a silicon monocrystalline substrate 10 by a sol-gel method. In Akahane, the epoxy-based thermosetting adhesive is used when the silicon monocrystalline substrate 10, a sealing plate 20, a common ink chamber forming substrate 30 and an ink chamber side plate 40 are sequentially bonded and integrated. However, the passage unit and the actuator unit are not bonded using the epoxy-based thermosetting adhesive. Additionally, Akahane does not teach or suggest a piezoelectric sheet being disposed over a plurality of pressure chambers. Therefore, Applicants request the withdrawal of the rejection of claims 5-7 under 35 U.S.C. 103(a) for at least the reasons mentioned above.

IV. Conclusion

In view of the above amendments and remarks, Applicant submits claims 1-7 recite subject matter that is neither taught nor suggested by the applied references. The specification is amended. Claim 1 is amended. No new matter is presented. Thus, for the reasons presented above, claims 1-7 are believed by Applicant to define patentable subject matter and should be passed to issue at the earliest possible time. A Notice of Allowance is requested.

Respectfully submitted,



Eugene LeDonne
Reg. No. 35,930
REED SMITH LLP
599 Lexington Avenue
New York, NY 10022
(P) 212-521-5402
Attorney for Applicant